

We claim:

1. A process for obtaining a product rich in unsaponifiable valuable substances from at least one of crude sulphate soap, crude tall oil or tall oil pitch, comprising the steps of:

(a) providing a feed of at least one of crude sulphate soap, saponified crude tall oil or saponified tall oil pitch,

(b) providing a softener and incorporating said softener into said feed to produce a mixed feed, wherein said softener possesses the following properties at the operation conditions of the process:

- (i) the viscosity of the mixed feed having the softener incorporated therein is lower than the viscosity of the feed without the ener;
- (ii) the vapour pressure of the softener is lower than the vapour pressure of the unsaponifiabiles of the feed;
- iii) the molecular weight of the softener is at least 750; and, optionally,
- iv) the softener is substantially immune to degradation and other side reactions caused by heat;

(c) drying said mixed feed to produce a dried mixed feed; and

(d) subjecting the dried mixed feed to a first high vacuum evaporation to obtain a product rich in unsaponifiable valuable substances in the form of a distillate.

2. The process of claim 1, wherein the mixed feed of step (b) is obtained by incorporating the softener into a feed of crude sulphate soap.

3. The process of claim 1, wherein the mixed feed of step (b) is obtained by saponifying a feed of crude tall oil or tall oil pitch, and subsequently incorporating the softener into the feed of saponified crude tall oil or saponified tall oil pitch.

4. The process of claim 1, wherein the mixed feed of step (b) is obtained by incorporating the softener into a feed of crude tall oil or tall oil pitch, and subsequently saponifying the feed having the softener incorporated therein.

5. The process of claim 1, wherein said distillate is subjected to a second high vacuum evaporation to remove light ends of said distillate and to obtain a product enriched in unsaponifiable valuable substances.

6. The process of claim 1, wherein said product enriched in unsaponifiable valuable substances is subjected to a third high vacuum evaporation to obtain a product being further enriched in unsaponifiable valuable substances.

7. The process of claim 1, wherein the product rich in unsaponifiable valuable substances is subjected to a crystallization step to obtain sterols.

8. The process of claim 5, wherein the product enriched in unsaponifiable valuable substances is subjected to a crystallization step to obtain sterols.

9. The process of claim 6, wherein the product being further enriched in unsaponifiable valuable substances is subjected to a crystallization step to obtain sterols.

10. The process of claim 7, wherein said crystallization step comprises using a solvent or a solvent mixture comprising at least one or two of the solvents selected from the group consisting of ketones, alkanols, hydrocarbons and water to crystallize the sterols from the unsaponifiable valuable substances.

11. The process of claim 8, wherein said crystallization step comprises using a solvent or a solvent mixture comprising at least one or two of the solvents selected from the group consisting of ketones, alkanols, hydrocarbons and water to crystallize the sterols from the unsaponifiable valuable substances

12. The process of claim 9, wherein said crystallization step comprises using a solvent or a solvent mixture comprising at least one or two of the solvents selected from the group consisting of ketones, alkanols, hydrocarbons and water to crystallize the sterols from the unsaponifiable valuable substances

13. The process of claim 1, wherein the crude sulphate soap or the saponified crude tall oil or the saponified tall oil pitch is in the form of sodium and/or potassium soaps.

14. The process of claim 1, wherein the evaporation residue from the first evaporation is acidulated to obtain acids and said acids are recovered, and the residue is re-used as said softener.

15. The process of claim 1, wherein said softener is selected from the group consisting of high boiling hydrocarbons, high boiling naphthenes, polyglycols, high molecular weight silicon oils and high molecular weight esters.

16. The process of claim 1, wherein the amount of said softener used is between 1 wt-% and 500 wt-% based on the dry weight of the feed.

17. The process of claim 1, wherein the unsaponifiables are soluble in the softener.

18. The process of claim 1, wherein the softener is not resistant to degradation and other side reactions.

19. The process of claim 18, wherein the reactions are regulated so as to ensure that there is a sufficient amount of non-degraded softener remaining in the mixed feed to achieve the intended effect.

20. The process of claim 1, wherein the molecular weight of the softener is at least 1,000.

21. The process of claim 20, wherein the molecular weight of the softener is at least 2,000.

22. The process of claim 1, wherein the softener is a high molecular weight ester, and wherein the process further comprises a pH value of 7-10.

23. The process of claim 22, wherein the pH value is 8-9.5.

24. The process of claim 6, in which the evaporation steps are carried out at a temperature of 100-350°C and at a pressure no higher than 25 mbar.

25. The process of claim 10, wherein the mixture comprises methyl ethyl ketone, methanol and water.

26. The process of claim 11, wherein the mixture comprises methyl ethyl ketone, methanol and water.

27. The process of claim 12, wherein the mixture comprises methyl ethyl ketone, methanol and water.

28. The process of claim 10, wherein the mixture comprises a hydrocarbon, methanol and water.

29. The process of claim 11, wherein the mixture comprises a hydrocarbon, methanol and water.

30. The process of claim 12, wherein the mixture comprises a hydrocarbon, methanol and water.

31. A process for obtaining a product rich in unsaponifiable valuable substances from at least one of crude sulphate soap, crude tall oil or tall oil pitch, comprising the steps of:

- (a) providing a feed of at least one of crude sulphate soap, saponified crude tall oil or saponified tall oil pitch,
  - (b) drying the feed of step (a) to produce a dried feed; and
  - (c) subjecting the dried feed to a first high vacuum evaporation to obtain a product rich in unsaponifiable valuable substances in the form of a distillate,
- wherein a softener is incorporated into said dried feed at any point prior to step (c), to produce a mixed feed,

wherein said softener possesses the following properties at the operation conditions of the process:

- (i) the viscosity of the mixed feed having the softener incorporated therein is lower than the viscosity of the feed without the softener;
- ii) the vapour pressure of the softener is lower than the vapour pressure of the unsaponifiables of the feed;
- iii) the molecular weight of the softener is at least 750; and, optionally,

iv) the softener is substantially immune to degradation and other side reactions caused by heat.

32. The process of claim 31, wherein the mixed feed of step (c) is obtained by incorporating the softener into a feed of crude sulphate soap.

33. The process of claim 31, wherein the mixed feed of step (c) is obtained by saponifying a feed of crude tall oil or tall oil pitch, and subsequently incorporating the softener into the feed of saponified crude tall oil or saponified tall oil pitch.

34. The process of claim 31, wherein the mixed feed of step (c) is obtained by incorporating the softener into a feed of crude tall oil or tall oil pitch, and subsequently saponifying the feed having the softener incorporated therein.

35. The process of claim 31, wherein said distillate is subjected to a second high vacuum evaporation to remove light ends of said distillate and to obtain a product enriched in unsaponifiable valuable substances.

36. The process of claim 31, wherein said product enriched in unsaponifiable valuable substances is subjected to a third high vacuum evaporation to obtain a product being further enriched in unsaponifiable valuable substances.

37. The process of claim 31, wherein the product rich in unsaponifiable valuable substances is subjected to a crystallization step to obtain sterols.

38. The process of claim 35, wherein the product enriched in unsaponifiable valuable substances is subjected to a crystallization step to obtain sterols.

39. The process of claim 36, wherein the product being further enriched in unsaponifiable valuable substances is subjected to a crystallization step to obtain sterols.

40. The process of claim 37, wherein said crystallization step comprises using a solvent or a solvent mixture comprising at least one or two of the solvents selected from the group consisting of ketones, alkanols, hydrocarbons and water to crystallize the sterols from the unsaponifiable valuable substances.

41. The process of claim 38, wherein said crystallization step comprises using a solvent or a solvent mixture comprising at least one or two of the solvents selected from the group consisting of ketones, alkanols, hydrocarbons and water to crystallize the sterols from the unsaponifiable valuable substances

42. The process of claim 39, wherein said crystallization step comprises using a solvent or a solvent mixture comprising at least one or two of the solvents selected from the group consisting of ketones, alkanols, hydrocarbons and water to crystallize the sterols from the unsaponifiable valuable substances



43. The process of claim 31, wherein the crude sulphate soap or the saponified crude tall oil or the saponified tall oil pitch is in the form of sodium and/or potassium soaps.

44. The process of claim 31, wherein the evaporation residue from the first evaporation is acidulated to obtain acids and said acids are recovered, and the residue is re-used as said softener.

45. The process of claim 31, wherein said softener is selected from the group consisting of high boiling hydrocarbons, high boiling naphthenes, polyglycols, high molecular weight silicon oils and high molecular weight esters.

46. The process of claim 31, wherein the amount of said softener used is between 1 wt-% and 500 wt-% based on the dry weight of the feed.

47. The process of claim 31, wherein the unsaponifiables are soluble in the softener.

48. The process of claim 31, wherein the softener is not resistant to degradation and other side reactions.

49. The process of claim 48, wherein the reactions are regulated so as to ensure that there is a sufficient amount of non-degraded softener remaining in the mixed feed to achieve the intended effect.

50. The process of claim 31, wherein the molecular weight of the softener is at least 1,000.

51. The process of claim 50, wherein the molecular weight of the softener is at least 2,000.

52. The process of claim 31, wherein the softener is a high molecular weight ester, and wherein the process further comprises a pH value of 7-10.

53. The process of claim 52, wherein the pH value is 8-9.5.

54. The process of claim 36, in which the evaporation steps are carried out at a temperature of 100-350°C and at a pressure no higher than 25 mbar.

55. The process of claim 40, wherein the mixture comprises methyl ethyl ketone, methanol and water.

56. The process of claim 41, wherein the mixture comprises methyl ethyl ketone, methanol and water.

57. The process of claim 42, wherein the mixture comprises methyl ethyl ketone, methanol and water.

58. The process of claim 40, wherein the mixture comprises a hydrocarbon, methanol and water.

59. The process of claim 41, wherein the mixture comprises a hydrocarbon, methanol and water.

60. The process of claim 42, wherein the mixture comprises a hydrocarbon, methanol and water.

61. The process of claim 46, wherein the amount of said softener used is between 5 wt-% and 200 wt-% based on the dry weight of the feed.

62. The process of claim 16, wherein the amount of said softener used is between 5 wt-% and 200 wt-% based on the dry weight of the feed.

63. The process of claim 61, wherein the amount of said softener used is between 10 wt-% and 100 wt-% based on the dry weight of the feed.

64. The process of claim 62, wherein the amount of said softener used is between 10 wt-% and 100 wt-% based on the dry weight of the feed.

65. The process of claim 6, wherein the product being further enriched in unsaponifiable valuable substances is subjected to further evaporation steps, resulting in a product being highly enriched in unsaponifiable valuable substances.

66. The process of claim 36, wherein the product being further enriched in unsaponifiable valuable substances is subjected to further evaporation steps, resulting in a product being highly enriched in unsaponifiable valuable substances.

67. The process of claim 65, wherein the evaporation steps are conducted as a single distillation step.

68. The process of claim 66, wherein the evaporation steps are conducted as a single distillation step.